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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/865,001	05/24/2001	Marc Noel Blais	ROC9-2000-0162-US1	3815

46296	7590	07/27/2005	EXAMINER

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EXAMINER
ALI, SYED J

ART UNIT	PAPER NUMBER
2195	

DATE MAILED: 07/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
	09/865,001	BLAIS ET AL.
Office Action Summary	Examiner	Art Unit	
	Syed J. Ali	2195	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>30 June 2005</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-6,8-12 and 15-18* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *4,5 and 9* is/are allowed.

6)☒ Claim(s) *1,3,6,10-12 and 16-18* is/are rejected.

7)☒ Claim(s) *8 and 15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1.   This office action is in response to the amendment filed June 30, 2005. Claims 1, 3-6, 8-

12, and 15-18 are presented for examination.

2.   The text of those sections of Title 35, U.S. code not included in this office action can be

found in a prior office action.

Claim Rejections - 35 USC § 101

3.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or
> any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and
> requirements of this title.

4.   **Claims 10-12 and 15-18 are rejected under 35 U.S.C. 101 because the claimed**

invention is directed to non-statutory subject matter.

5.   As per claims 10 and 16, the claimed "program product" is non-statutory as it is not

tangibly embodied, in that it fails to include any hardware bearing the program product. The

signal bearing media could be a carrier wave or other non-tangible media, e.g. "transmission

media" on page 30 of Applicant's specification.

Claims 11-12, 15, and 17-18 are rejected for at least the same reasons as presented for

their parent claims, as they fail to present any limitations that resolve the deficiencies of the

claims from which they depend.

Claim Rejections - 35 USC § 103

6.   **Claims 1, 3, 6, and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Whaley et al. ("Compositional Pointer and Escape Analysis for Java Programs").**

7.   As per claim 1, Whaley teaches the invention as claimed, including an apparatus, comprising:

at least one processor (Abstract);

a memory coupled to the at least one processor (Abstract);

a first compilation unit residing in the memory, the first compilation unit comprising a plurality of object oriented classes that are part of an object oriented program, wherein the object oriented program is defined by the combination of the first compilation unit and at least one other compilation unit (§§ 3.1, 3.2, 8.1); and

a compiler residing in the memory and executed by the at least one processor (§ 1.2) in a partial compilation environment (§ 8.1), the compiler allocating at least one object in the first compilation unit to an invocation stack frame for a method in the first compilation unit that allocates the at least one object (§ 7.2), wherein the compiler comprises:

an escape analysis mechanism that marks each instruction in the first compilation unit that allocates a new object as one that has escaped, will not escape, or will escape based on information available from classes visible in the first compilation unit (§§ 2.1, 2.2, 3.4, 4); and

an object allocation mechanism that allocates at least one object that is created by an instruction marked as no escape by the escape analysis mechanism to an invocation stack frame for a method that allocates the object (§ 7.2).

8.   It is noted that Whaley does not mark instructions using the tags of "global escape", "arg escape", and "no escape". However, these are well known marking used in escape analysis (see Choi, "Escape Analysis for Java"). An object that does not escape the method in which it was created is referred to as "no escape", an object that escapes the method in which it was created but not the thread in which it was created is referred to as "arg escape", while an object that escapes the method and thread in which it was created is referred to as "global escape". While Whaley does not use these specific terms, it is evident that the escape analysis employed performs these same determinations. Whaley begins by looking at a particular method to determine if the object remains within the method (§ 2.1). If so, the object does not escape, and it may be allocated on the stack ("no escape"). If not, another step in the analysis is performed to determine if the object stays within the creating thread (§ 2.2). If the object remains within the creating thread, the object corresponds to the claimed "arg escape", and if the object escapes the creating thread, the object corresponds to the claimed "global escape". Whaley indicates that if an object is found to not escape it's creating method, it may be allocated on the stack. Hereinafter, Whaley will be treated as teaching the claimed "global escape", "arg escape", and "no escape" features based on the equivalent analysis performed therein.

9.   As per claim 3, Whaley teaches the invention as claimed, including the apparatus of claim 1 wherein the escape analysis mechanism marks each instruction in the first compilation unit that allocates a new object as one of global escape, no escape, and arg escape based on information available from classes visible in the first compilation unit (§§ 2.1, 2.2) and from classes that are outside the first compilation unit that are visible in a specified classpath (§ 7.1).

As per claim 6, Whaley teaches the invention as claimed, including a method for allocating

objects to memory in an object oriented program that comprises a first compilation unit and at

least one other compilation unit (§§ 3.1, 3.2), the method comprising the steps of:

 (A) compiling the first compilation unit (§ 1.2); and

 (B) during the compiling of the first compilation unit and before the compilation of

the second compilation unit (§ 8.1), marking each instruction that allocates a new object

as one of global escape, no escape, and arg escape based on information available from

classes in the first compilation unit and from classes that are outside the first compilation

unit that are visible in a specified classpath (§§ 2.1, 2.2, 7.1); and

 allocating at least one object that is created by an instruction marked as no escape

by the escape analysis mechanism to an invocation stack frame for a method that

allocates the at least one object (§ 7.2).

10. As per claim 10, Whaley teaches the invention as claimed, including a program product

comprising:

 a compiler that compiles in a partial compilation environment (§ 8.1) a first compilation

unit comprising a plurality of object oriented classes that are part of an object oriented program

(§ 1.2), wherein the object oriented program is defined by the combination of the first

compilation unit and at least one other compilation unit (§§ 3.1, 3.2), the compiler allocating at

least one object in the first compilation unit to an invocation stack frame for a method in the first

compilation unit that allocates the at least one object (§ 7.2);

an escape analysis mechanism that marks each instruction in the first compilation unit that allocates a new object as one of global .escape, no escape, and arg escape based on information available from classes visible in the first compilation unit (§§ 2.1, 2.2, 3.4, 4); and

an object allocation mechanism that allocates at least one object that is created by an instruction marked as no escape by the escape analysis mechanism to an invocation stack frame for a method that allocates the object (§ 7.2); and

wherein the escape analysis mechanism marks each instruction in the first compilation unit that allocates a new object as one of global escape, no escape, and arg escape based on information available from classes visible in the first compilation unit (§§ 2.1, 2.2) and from classes that are outside the first compilation unit that are visible in a specified classpath (§ 7.1); and

signal bearing media bearing the compiler (Abstract).

11.   As per claim 11, Whaley teaches the invention as claimed, including the program product of claim 10 wherein the signal bearing media comprises recordable media (Abstract).

12.   As per claim 12, Whaley teaches the invention as claimed, including the program product of claim 10 wherein the signal bearing media comprises transmission media (Abstract).

Allowable Subject Matter

13.   **Claims 4-5 and 9 are allowed.**

14.   Claims 8 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

15.   **The following is a statement of reasons for the indication of allowable subject matter:**

16.   The claimed features relating to generating two versions of code in a partial compilation environment, one using stack allocation and the other using heap allocation, is not taught by the prior art. In prior art dynamic compilers, e.g. the Jalapeno dynamic compiler, object allocation may be changed from the stack to the heap, or vice versa, at run-time based on changing conditions. Other dynamic compilers switch between interpreting and compiling code at run-time. However, the feature of generating two versions of code, one using stack allocation and the other using heap allocation, and choosing one or the other at run-time is not taught by the prior art, particularly with respect to partial compilation environments.

Response to Arguments

17.   Applicant's arguments with respect to claims 1, 3, 6, 10-12, and 16-18 have been considered but are moot in view of the new grounds of rejection.

Conclusion

18.   Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (571) 272-3769. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Syed Ali
July 21, 2005

MAJID BANANKHAH
PRIMARY EXAMINER